



Heat Stress Evaluation of Clothing Ensembles with Un-Acclimatized Subjects

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INTRODUCTION

- The progressive heat stress protocol can be used to determine the total evaporative resistance and the WBGT clothing adjustment factor for clothing ensembles.
- Usually, the participants are acclimatized prior to the trials. In this study, five un-acclimatized participants wore work clothes and Tyvek® coveralls with hood while walking on a treadmill.

OBJECTIVES

- To determine the critical conditions, total evaporative resistance and clothing adjustment factor for participants wearing work clothing and Tyvek coveralls with hood.
- To compare the critical conditions of un-acclimatized subjects against that of acclimatized subjects from previous studies.

METHODS

- Five adults participated in the wear trials.
- Progressive heat stress protocol at 50% relative humidity, 0.5 m/s air speed
- Treadmill: 1.25 m/s speed, 0% grade
- Monitored: Heart Rate, Core Temperature, Skin Temperature (chest, arm, thigh, calf)

ANALYSIS METHOD

- The primary dependent variable is wet bulb globe temperature (WBGT, an index of the environment) and derived evaporative resistance.
- A General Linear Model with one fixed effect (clothing) and one random effect (participant) was used to test clothing effects.
- A multiple comparison test was used to determine where the main differences occurred.

DISCUSSION

- As expected, there were significant differences between work clothes and Tyvek for unacclimatized participants.
- There was a significant difference found for WBGT in work clothing between unacclimatized and acclimatized participants. This is consistent with other findings.
- There was no significant difference found for total evaporative resistance in work clothing or Tyvek wear trials. This indicates that an acclimatization period might not be necessary when determining total evaporative resistance during wear trials.

Figure 1: WBGT for acclimatized and un-acclimatized participants

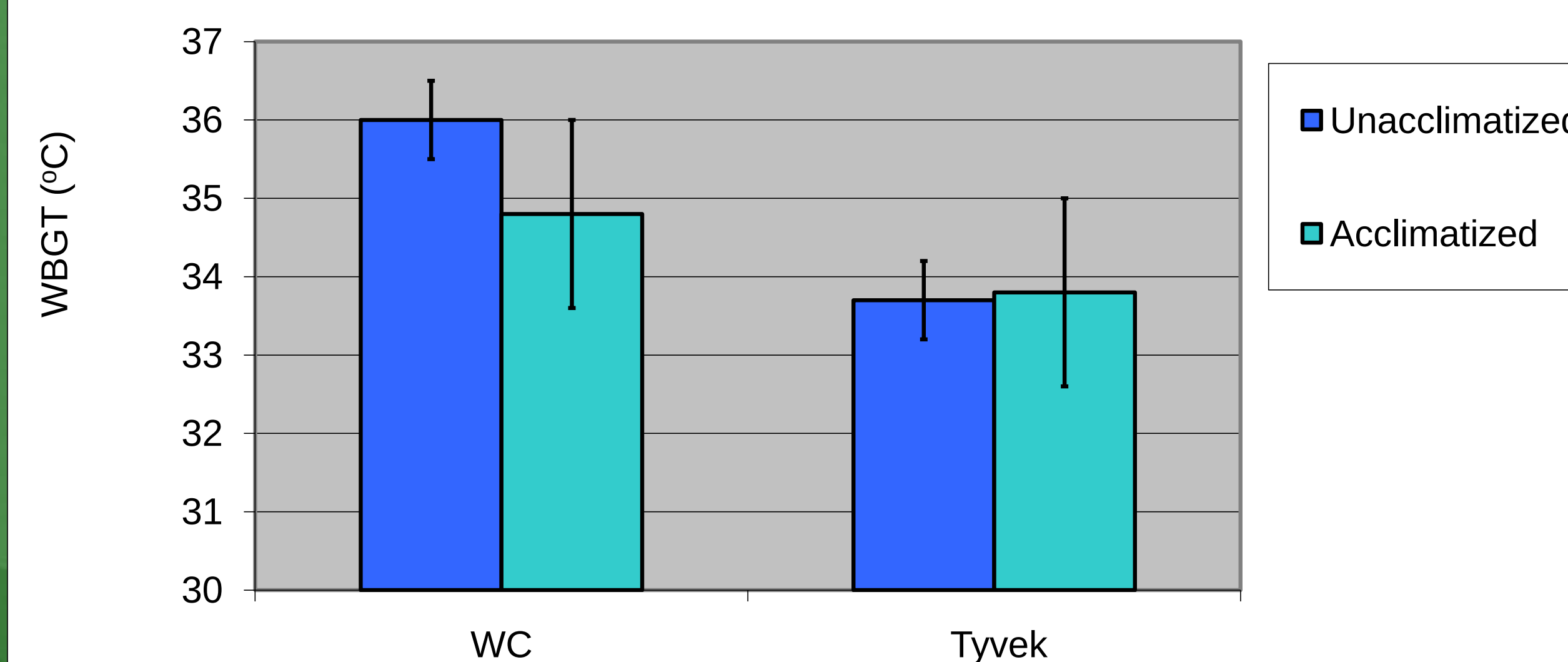


Figure 2: Total evaporative resistance for acclimatized and un-acclimatized participants

